

# Keysight Technologies

## L8990M Modular Switch Matrices

Technical Overview



## Introduction

The Keysight L8990M Modular Switch Matrices provide a simple and flexible platform for RF switching. The L8990M can support up to 30 switch channels in a 2U rack-mountable enclosure with signal frequencies up to 67 GHz. It can support up to 66 switch channels in a 4U high enclosure. This provides the capability to test a wide range of RF and telecommunication products and devices.

## Features and Benefits

- Excellent RF performance – based on the proven family of Keysight RF switches, specified for low loss and high repeatability of applications up to 67 GHz
- User-defined configurations – modules and slot locations are specified by the user
- Fast delivery – many modules maintained in stock
- Lower cost – standard platform and modules
- Automated and manual control – based on the Keysight L449n Controller with LAN, SCPI command set and web-based GUI
- Accessories and custom capabilities – RF cables and other RF devices

## Applications

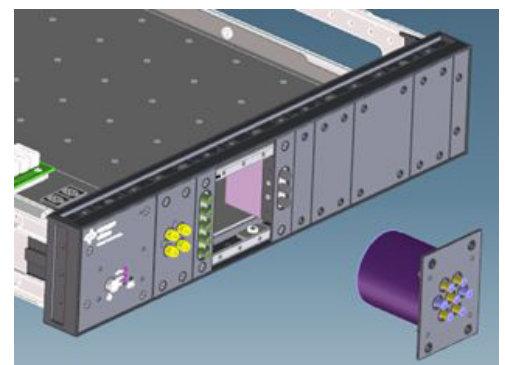
The Keysight L8990M Modular Switch Matrix is useful for prototyping, benchtop setups and integrated systems in a wide variety of RF applications including:

- Satellite
- Antennas
- Radar
- Electronic warfare
- Radios
- RF components
- Mobile phones
- Base stations

## Modular Switch Matrix Description

Each L8990M Modular Switch Matrix is delivered fully integrated according to the user-specified configuration. The Modular Switch Matrix includes:

- Rack-mountable enclosure, either 2U or 4U
- Modules installed in front panel slots – each module consists of a switch or other RF component secured to a sub-panel
- Filler panels in unused slots
- Internal controller and power supply
- Internal driver boards and cables necessary to support chosen modules
- User manual, customized for the specified configuration
- RF cables available



## Standard Modules

The following standard modules support our most popular RF switches. Many are maintained in stock for fastest delivery.

Module	Description	Frequency (B/C/D/E/F)	# Slots Filled
L3111X	SPDT Switch, Terminated	20 GHz, 26.5 GHz, 40 GHz, 50 GHz, 67 GHz	1
L3113X	SPDT Switch, Unterminated	20 GHz, 26.5 GHz, 40 GHz, 50 GHz, 67 GHz	1
L3114X	4-port Bypass Switch, Terminated	20 GHz, 26.5 GHz, 40 GHz, 50 GHz, 67 GHz	1
L3117X	5-port Bypass Switch, Unterminated	20 GHz, 26.5 GHz, 40 GHz, 50 GHz, 67 GHz	1
L3122X	SP4T Multiport Switch	20 GHz, 26.5 GHz, 40 GHz	3
L3121X	SP6T Multiport Switch	20 GHz, 26.5 GHz, 40 GHz	3
L3131X	Transfer Switch	20 GHz, 26.5 GHz, 40 GHz, 50 GHz	2
L3126X	6-port Matrix Switch	20 GHz	3
L3041X	Attenuator 1-11dB	26.5 GHz, 40 GHz	2
L3042X	Attenuator 1-11dB	50 GHz	2
L3044X	Attenuator 0-70dB	26.5 GHz, 40 GHz	2
L3043X	Attenuator 0-90dB	26.5 GHz, 40 GHz, 50 GHz	2
L3032A	LEDs - 2 position	NA	1
L3033A	LEDs - 4 position	NA	1
L3034A	LEDs - 6 position	NA	1

Detailed specifications for each of the switch components listed above are available online: <http://literature.cdn.keysight.com/litweb/pdf/5989-6031EN.pdf?id=1462161>

## Accessories

Low-loss, semi-flexible RF cables for external interconnect of installed modules are available. The following cables are maintained in stock for fastest delivery:

- 150 mm (6"), 26.5 GHz
- 150 mm (6"), 40 GHz
- 305 mm (12"), 26.5 GHz
- 305 mm (12"), 40 GHz
- 610 mm (24"), 26.5 GHz
- 610 mm (24"), 40 GHz

## Custom Modules and Capabilities

In addition to the standard modules listed above, Keysight is able to deliver the L8990M with custom capabilities, including:

- Custom Modules. Keysight can install other RF components on a L8990M sub-panel. This may include attenuators (both fixed and variable), combiners, dividers, adapters (e.g. N-type for mounting a noise generator) and other devices. Multiple switches can be mounted on a single sub-panel.
- Semi-rigid RF cables for repeatable interconnect of installed modules.

Note that custom modules are typically limited to components that can be mounted directly on a L8990M sub-panel, are passive or can otherwise be controlled/powered by the standard L4490A/L4491A controller.

For challenging applications, please contact Keysight at the email address listed below. Keysight has shipped 1000's of custom switch matrices in response to a wide range of application-specific requirements.

## L8990M Control and Enclosure

### Software and control

The L8990M Modular Switch Matrix platform is based on the standard Keysight L4490A/L4491A controller. This controller provides a standard set of programming commands and a defined web-based GUI for manual control and monitoring of the installed switches. Two different control methods are available:

- Set of standard SCPI commands
- Web-based graphical user interface via the LAN - this GUI enables effortless manual operation of the switches and provides visual indication of the switch positions

The LAN connector is on the rear panel. For more information on the L4490A/L4491A platform, refer to <http://cp.literature.keysight.com/litweb/pdf/5989-7857EN.pdf>

### AC Power

The L8990M Modular Switch Matrix is powered by standard 100V to 240V, 50-60Hz AC input. The power input connector is fused and located on the rear panel.

### Physical Size

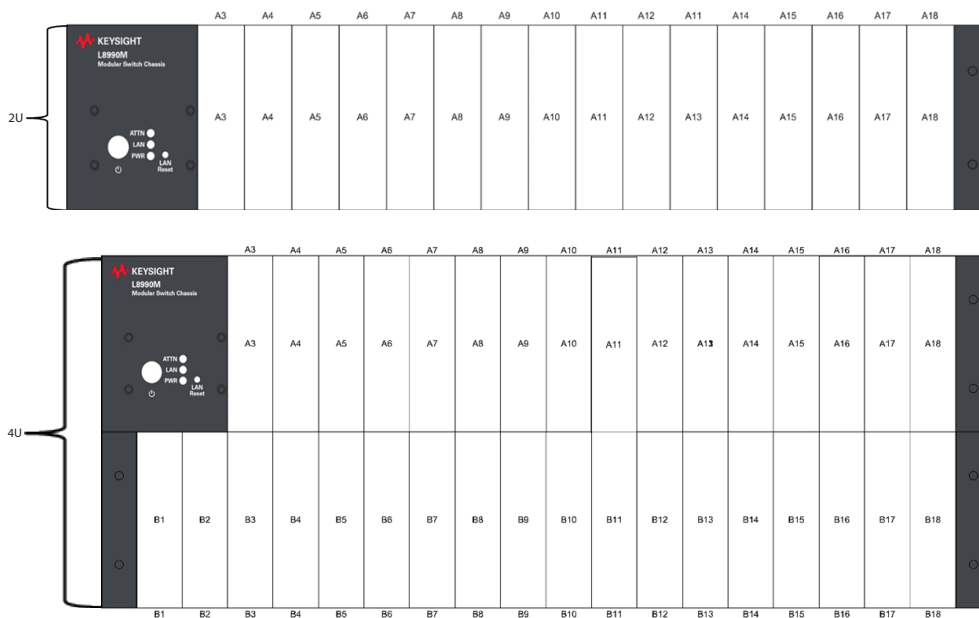
The L8990M Modular Switch Matrix is standard rack mount width, either 2U or 4U in height and 584mm (23 in) deep. Feet and rack mount ears are included.



## Price and delivery

To request pricing and delivery, simply send an email to [quotes.adsys@keysight.com](mailto:quotes.adsys@keysight.com). Please provide the following information in your request:

- 1) Mark your request with “L8990M” or “Modular Switch Matrix”
- 2) Specify Enclosure and Standard Modules:
  - Choose either the 2U or 4U enclosure
  - List the standard modules for installation in the enclosure, from the tables of standard modules above
  - For each module, specify the slot location(s) from the diagrams below - note:
    - Some modules require multiple slots
    - Slots A1-A2 are not available for switches, they are occupied by the power switch & status LEDs
    - Keysight will include blank filler panels in all empty slots



- 3) Specify Standard Accessories (if any):
  - Semi-Flexible RF Cables: specify the desired cable lengths, frequencies and quantities from the list above
- 4) Specify Custom Capabilities (if any):
  - Custom Modules: Identify the specific component (manufacturer and part number) or otherwise describe the desired component - identify the desired slot location(s) from the diagram above
  - Semi-rigid RF cables: Identify the specific modules and port for each end of each cable - please provide a block diagram or sketch (hand-drawn is acceptable)
- 5) Provide your contact information and any other information you believe is pertinent. Keysight will respond to your request within one to two business days. In most cases, the Keysight response will summarize your requested configuration and provide budgetary pricing and delivery. If your request includes custom capabilities, the initial Keysight response may consist of questions or other desired clarifications, and delivery will be extended to include the necessary design time.

## Application assistance:

Keysight's application experts are available to help optimize the system, taking full advantage of the system capability for your unique application.

Operator training is also available to help you get the system into service quickly.

If your application goes beyond the standard system offering described above, Keysight program managers and engineering professionals can help define and implement unique functionality. They ensure that your custom system requirements are implemented successfully.

[www.keysight.com/find/adsystems](http://www.keysight.com/find/adsystems)